

A POLYTYPIC INTERPRETATION OF THE CALIFORNIA
CARPENTER BEE *XYLOCOPA CALIFORNICA* WITH THE
DESCRIPTION OF A NEW SUBSPECIES AND NOTES
ON A POSSIBLE POLYTOPIC FORM

(Hymenoptera: Apoidea)

PAUL D. HURD, JR.

University of California, Berkeley

In the course of preparing a review of the Carpenter bees of California¹ a new subspecies of *Xylocopa californica* has been recognized in the material originating from the mountainous regions of cismontane southern California.

Cresson (1864) characterized as a new species *Xylocopa californica* from Fort Crook, California, and *Xylocopa arizonensis* from Arizona. Cockerell (1904) remarked that he could find no valid structural characters separating these two forms and regarded them as subspecies. *X. californica arizonensis*, according to Cockerell, occurred from Los Angeles, California, eastward to New Mexico and southward to San José de Guaymas, Mexico; *californica* proper was restricted to northern California.

Ackerman (1916:230) states in his revision of the Nearctic species that *californica* and *arizonensis* are specifically distinct. This author mentions that he noted a difference in the genitalia of the two forms and further remarked that he found differences in coloration and in the expression of pale pilosity on the abdomen. He gives the geographic range of *californica* as California, Nevada, Colorado and South Dakota and that of *arizonensis* as Arizona, New Mexico, Lower California, Texas, and Mexico. In the recent Synoptic Catalog of Hymenoptera of America north of Mexico Michener (1951) has accorded *californica* and *arizonensis* subspecific status listing *californica arizonensis* from Texas, New Mexico, Arizona, California, Mexico (deserts) and *californica* proper from South Dakota, Colorado, Nevada, Arizona and California.

The present writer has made a critical morphological study of this complex and has been unable to demonstrate any structural character, apart from color and the amounts of pale pilosity, which

¹ The Carpenter Bees of California, Bull. Calif. Insect Survey (in manuscript).

could be used to regard these forms as separate species. Moreover, a geographical analysis of the distribution of these forms clearly indicates they are geographic segregates (see map).

On the basis of coloration, *Xylocopa californica* contains three readily recognizable subspecies, which geographically replace one another. Each subspecies uses different softwoods in which to nest. The subspecies *californica* proper nests in redwood and incense cedar; *diamesa* nests principally in *Yucca whipplei*; and *arizonensis* uses various desert agaves and yuccas. From the high mountain localities in southern California (San Bernardino and San Jacinto Mountains) several specimens are available which are phenotypically very much like *californica* proper and suggest the possibility of a high mountain population which is using the isolated stands of incense cedar in which to nest. If this is the case it is possible that these bees are either of polytopic origin, having been derived from the yucca-using *diamesa*, or may be isolates of *californica* proper which have remained associated with these now isolated stands of incense cedar. It is significant, however, that the available specimens from these high mountain southern California localities are not phenotypically equivalent to the Sierran populations of *californica* proper. A critical field study of these isolates is needed before an understanding of origin and relationships can be achieved.

The three subspecies concerned may be separated by the following key.

KEY TO THE SUBSPECIES OF *XYLOCOPA CALIFORNICA* Cresson

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|------|---|--------------------|
| 1. | Males | 2 |
| | Females | 4 |
| 2(1) | Abdomen predominantly blue in color; fourth metasomal tergum without a medially interrupted fringe of whitish hairs | 3 |
| | Abdomen predominantly green in color; fourth metasomal tergum with a medially interrupted fringe of whitish hairs. North coast and Sierra Nevada Mountains of California and southern Cascade Mountains of Oregon | <i>californica</i> |
| 3(2) | Wings heavily infuscated with black and strongly violaceous; abdomen dark blue. Deserts of California, Arizona, Nevada, New Mexico, Utah, Texas and Mexico | <i>arizonensis</i> |
| | Wings paler, not heavily infuscated with black, less strongly violaceous; abdomen blue, often blue with traces of green. Mountains of cismontane southern California northward to Monterey County..... | <i>diamesa</i> |

- 4(1) Abdomen predominantly blue 5
 Abdomen predominantly green. North coast and Sierra Nevada
 Mountains of California and southern Cascade Mountains of Oregon
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- 5(4) Wings heavily infuscated with black and strongly violaceous; abdo-
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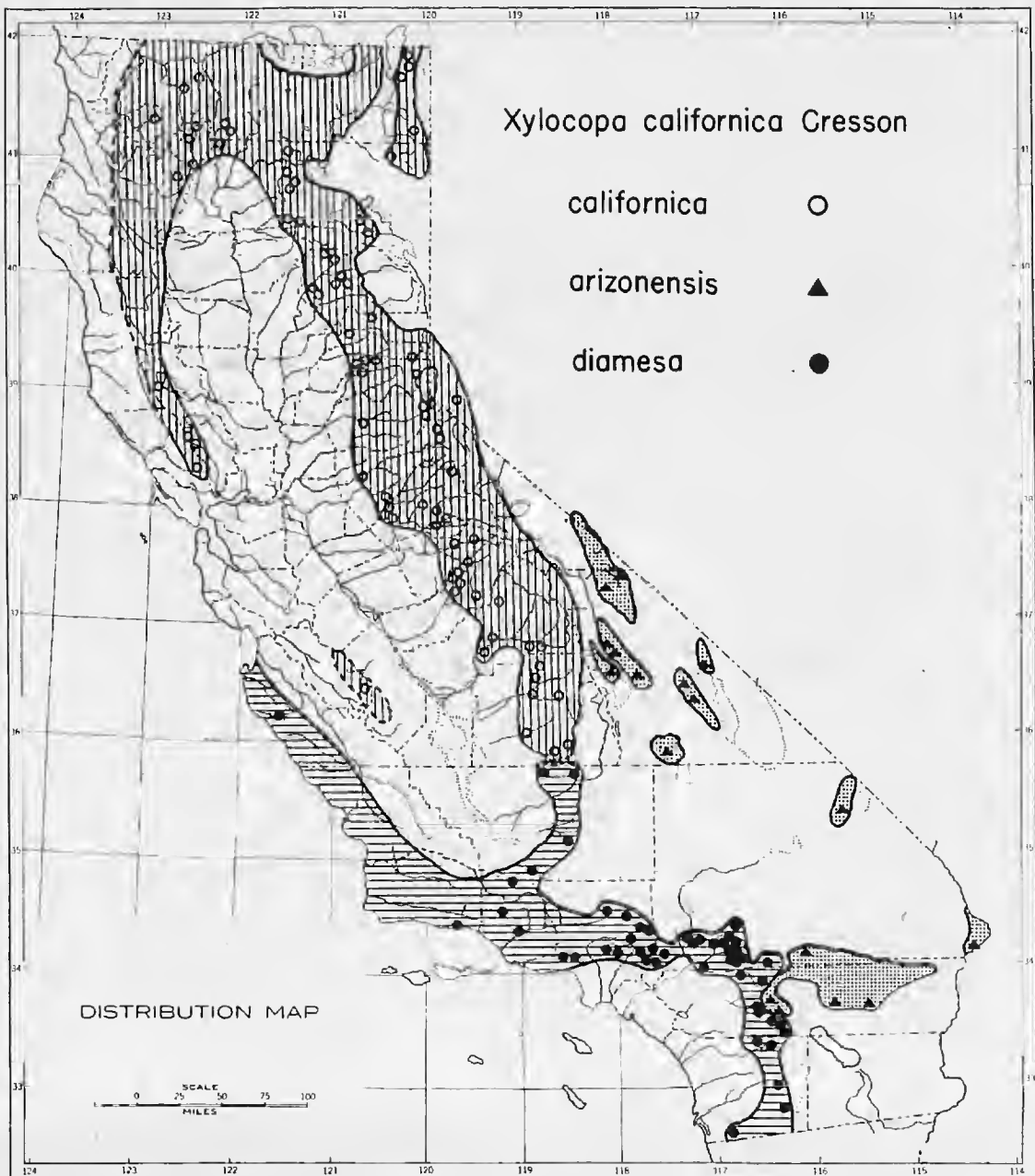


Fig. 1. — Distribution of *Xylocopa californica* Cresson within California.

Xylocopa californica diamesa Hurd, new subspecies

Diagnostic characters. — *Male*. Head, body, and legs blue, sometimes with green reflections. Wings infuscated with black, violaceous, but much less intense than in *arizonensis*, but darker than in *californica* proper. Abdomen without a fringe of pale hairs on fourth metasomal tergum. *Female*. Similar to male, but wings somewhat darker.

Holotype male, *allotype* female, and one paratype female from CRYSTAL LAKE, SAN GABRIEL MOUNTAINS, LOS ANGELES COUNTY, CALIFORNIA, July 9, 1952, collected by Joan Linsley. Additional paratypes are from the type locality, on June 29, 1950 (W. C. Bentinck, A. T. MacClay, J. W. MacSwain, M. J. Stebbins, and H. N. Yokoyama), on July 9, 1952, (R. L. Anderson, R. M. Bohart, E. M. Evans, A. Gregarick, H. L. Mathis, A. T. McClay, S. Miyagawa and J. H. Nakata), and on July 7, 1934, (C. D. Michener). Other paratypes are from Camp Baldy, San Gabriel Mountains, Los Angeles County, California, July 4, 1928, (F. B. Foley), on June 26, 1950, flowers *Fremontia* (P. D. Hurd, Jr.), on July 11, 1950, (H. L. Hansen, P. D. Hurd, Jr., J. D. Paschke), and on July 7, 1952, (A. R. Maggenti). One additional paratype is from Tanbark Flat, San Dimas Experimental Forest, San Gabriel Mountains, Los Angeles County, California, July 3, 1950, (H. M. Graham). The holotype and allotype are on deposit in the California Academy of Sciences.

As the name *diamesa* suggests this subspecies is intermediate in its character between *californica* proper and *arizonensis*. Geographically it occupies an intervening area between the aforementioned subspecies.

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